FIG. 1 PRIOR ART

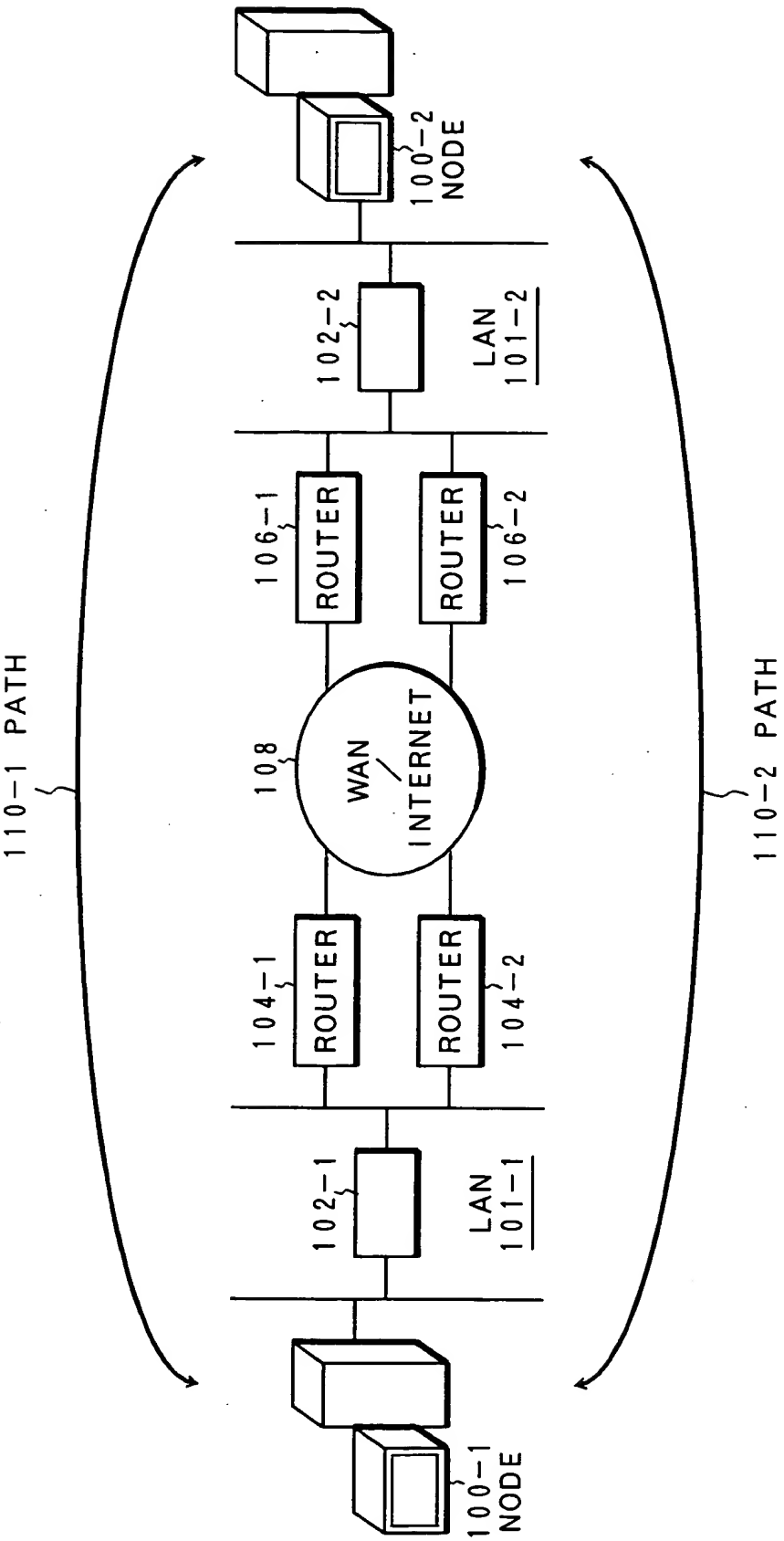


FIG. 2 PRIOR ART

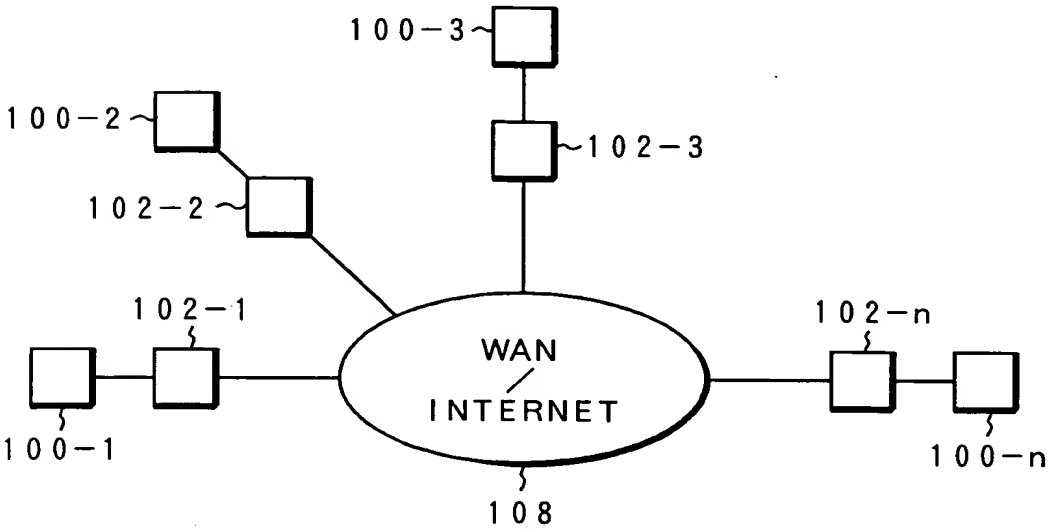


FIG. 3

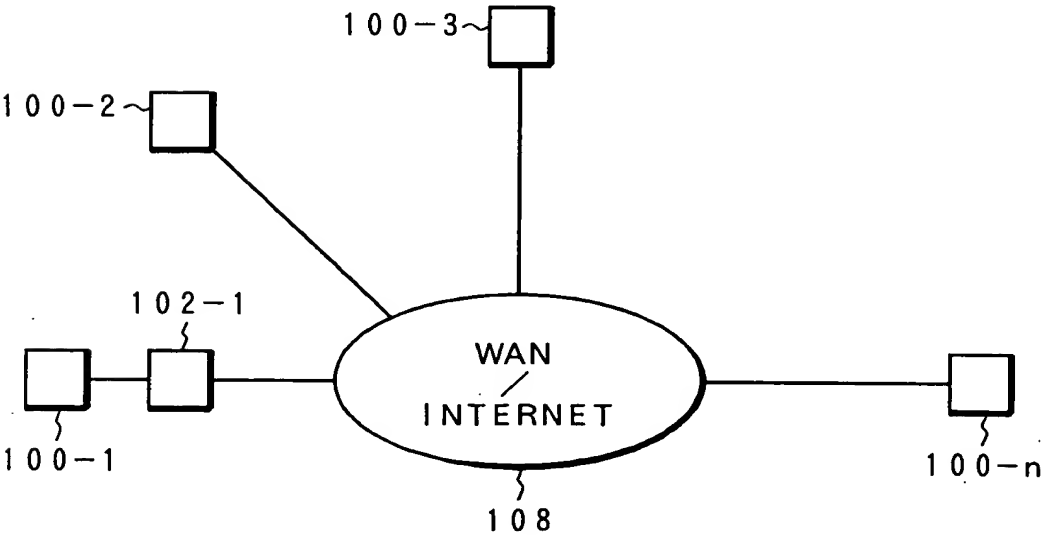


FIG. 4

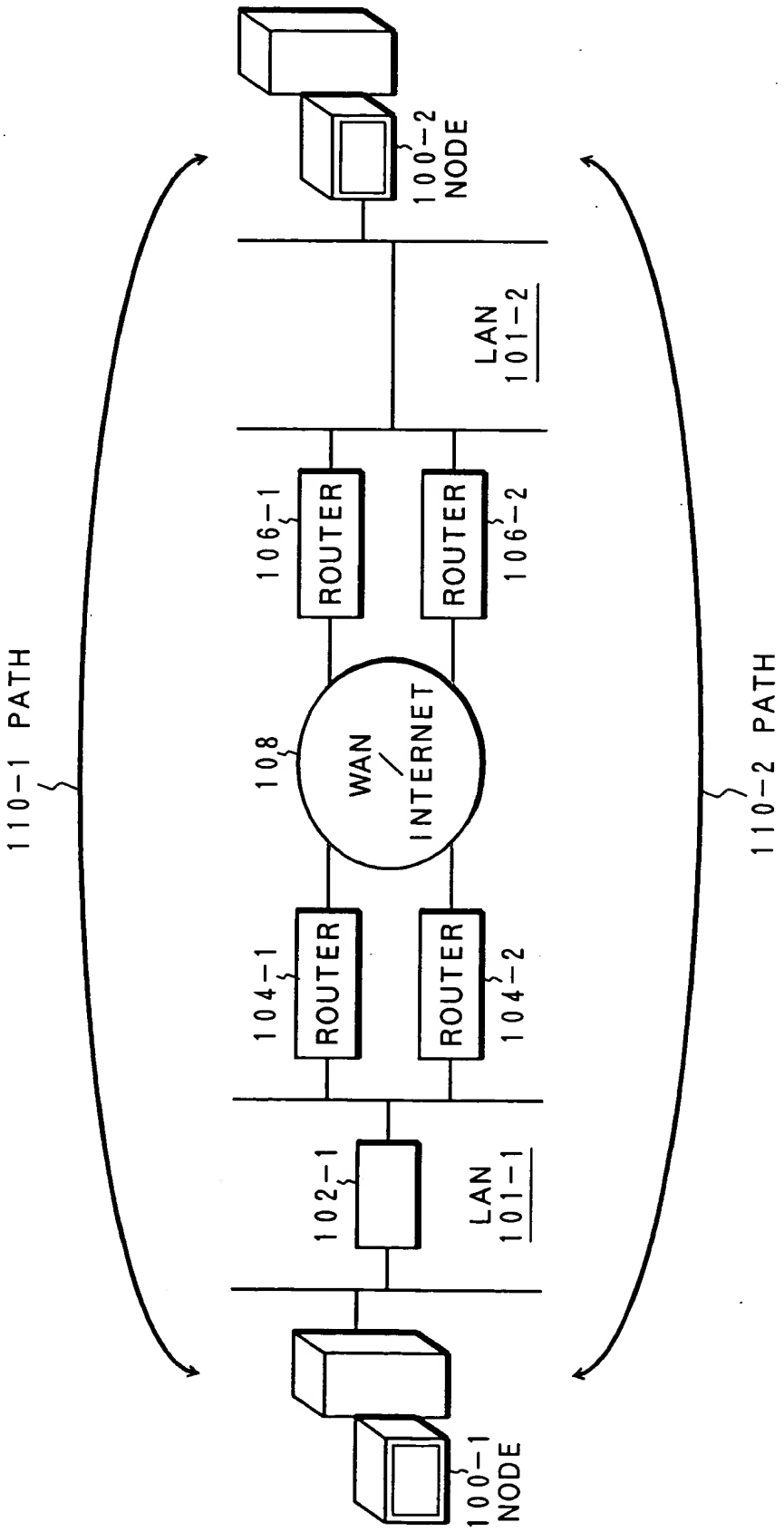

110-1 PATH
110-2 PATH
100-1 NODE
100-2 NODE
102-1
LAN 101-1
LAN 101-2
104-1 ROUTER
104-2 ROUTER
106-1 ROUTER
106-2 ROUTER
108 WAN / INTERNET

FIG. 5

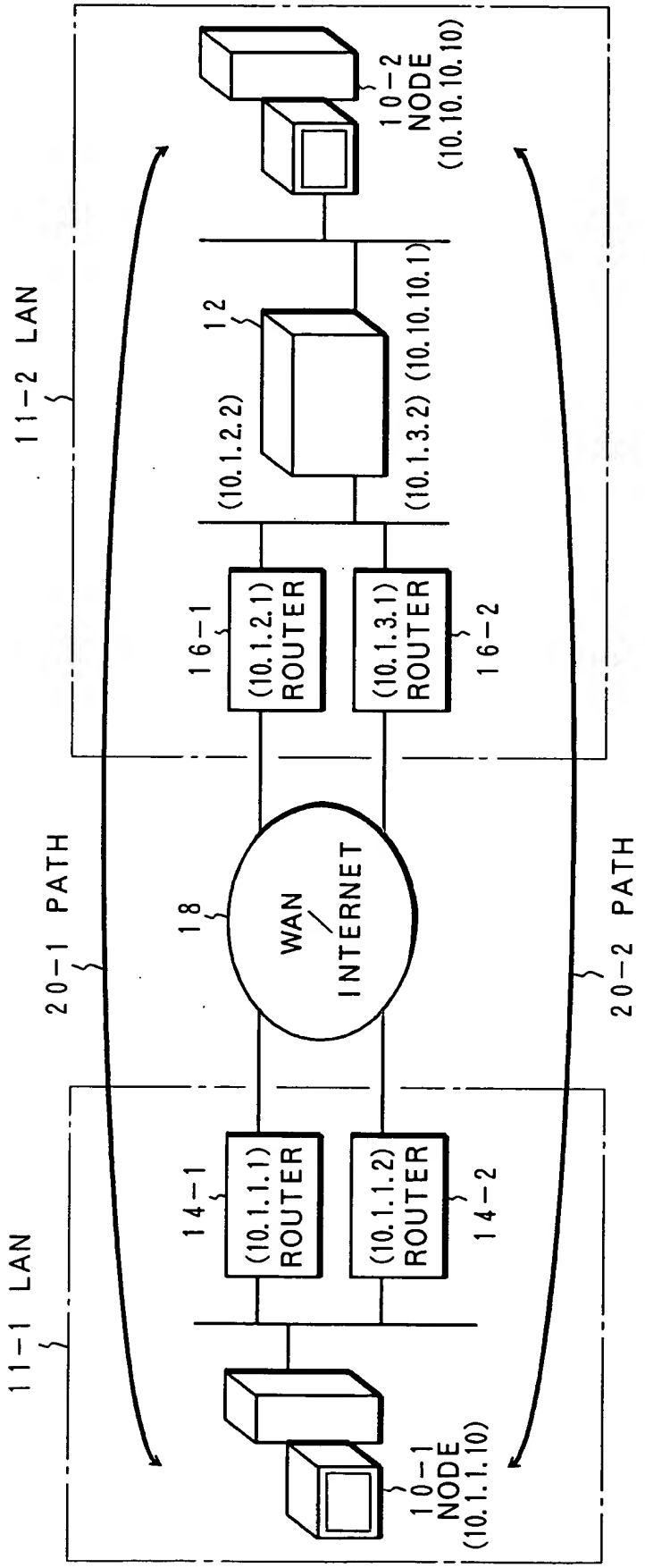

11-1 LAN
11-2 LAN
10-1 NODE (10.1.1.10)
10-2 NODE (10.10.10.10)
12
(10.1.2.2)
(10.1.3.2)
(10.10.10.1)
14-1 (10.1.1.1) ROUTER
14-2 (10.1.1.2) ROUTER
16-1 (10.1.2.1) ROUTER
16-2 (10.1.3.1) ROUTER
18 WAN INTERNET
20-1 PATH
20-2 PATH

FIG. 6

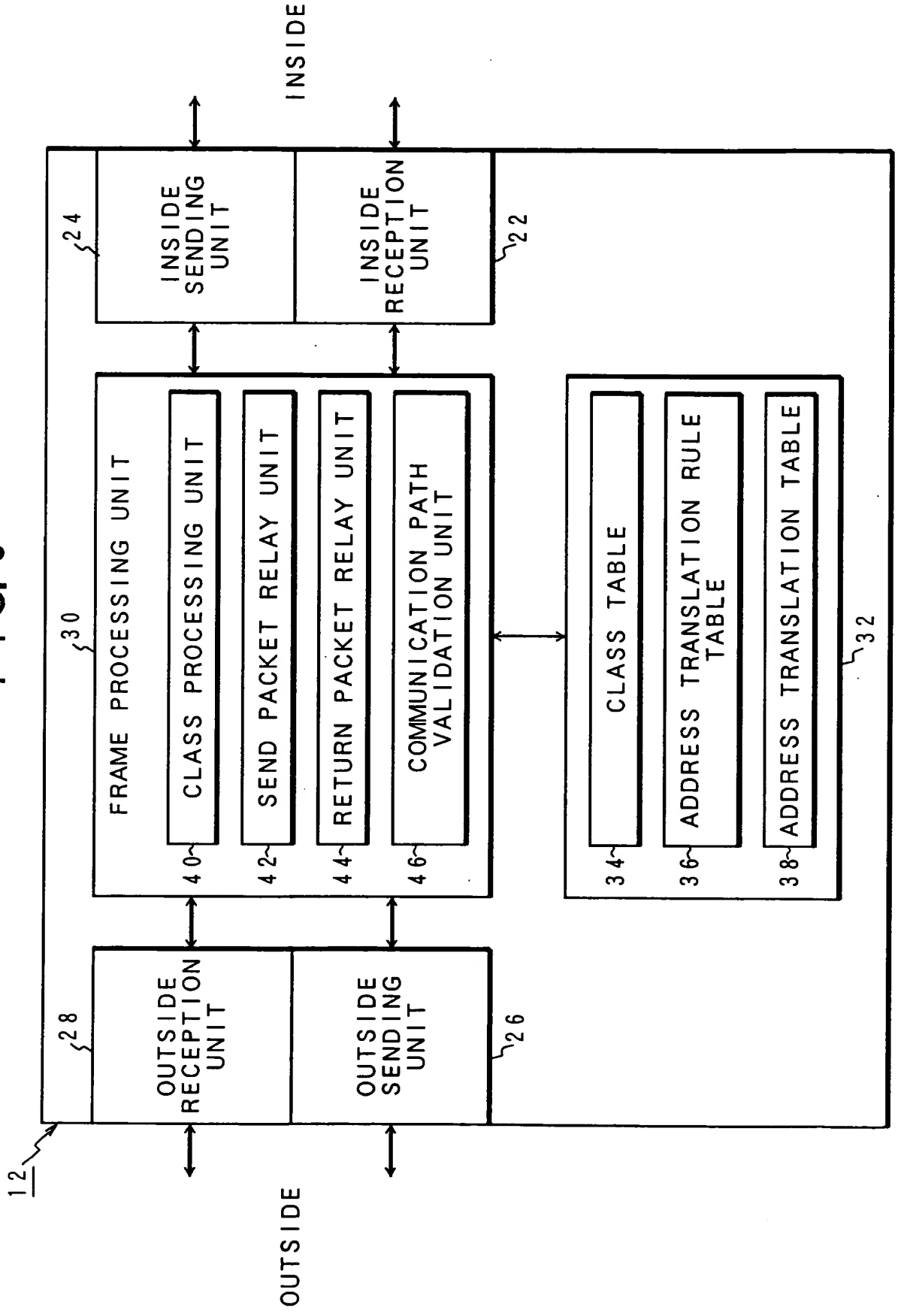

INSIDE
OUTSIDE
12
22
24
26
28
30
32
34
36
38
40
42
44
46
INSIDE RECEPTION UNIT
INSIDE SENDING UNIT
OUTSIDE RECEPTION UNIT
OUTSIDE SENDING UNIT
FRAME PROCESSING UNIT
CLASS PROCESSING UNIT
SEND PACKET RELAY UNIT
RETURN PACKET RELAY UNIT
COMMUNICATION PATH VALIDATION UNIT
CLASS TABLE
ADDRESS TRANSLATION RULE TABLE
ADDRESS TRANSLATION TABLE

FIG. 7

34 CLASS TABLE

CLASS NAME	PROTOCOL TYPE	INSIDE		OUTSIDE		STATUS
		ADDRESS	PORT	ADDRESS	PORT	
BUSINESS	TCP	ALL	472	ALL	ALL	FAIR
DEFAULT	ALL	ALL	ALL	ALL	ALL	FAIR

FIG. 8

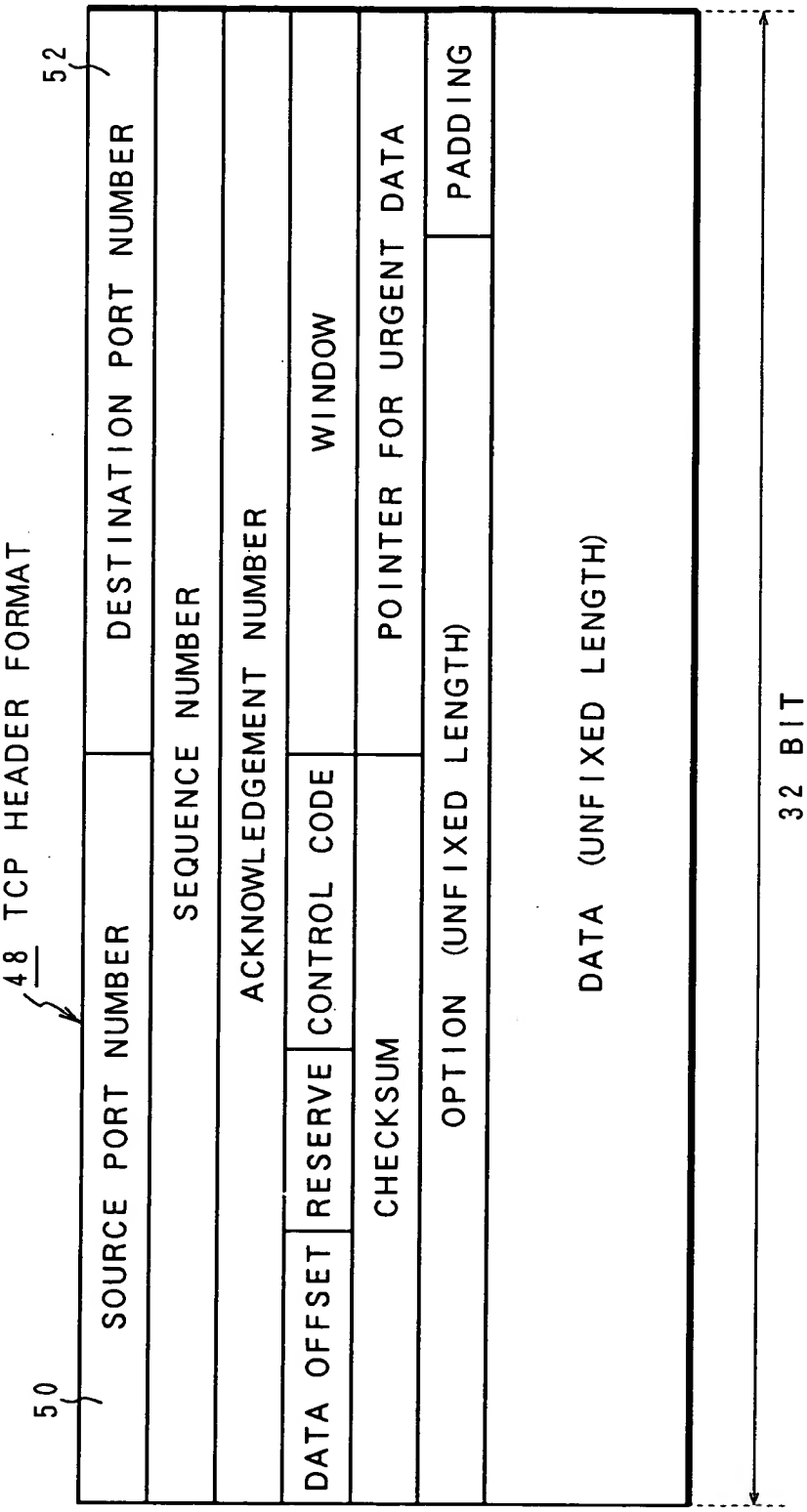

48 TCP HEADER FORMAT
50
52
SOURCE PORT NUMBER
DESTINATION PORT NUMBER
SEQUENCE NUMBER
ACKNOWLEDGEMENT NUMBER
DATA OFFSET
RESERVE
CONTROL CODE
WINDOW
CHECKSUM
POINTER FOR URGENT DATA
OPTION (UNFIXED LENGTH)
PADDING
DATA (UNFIXED LENGTH)
32 BIT

FIG. 9

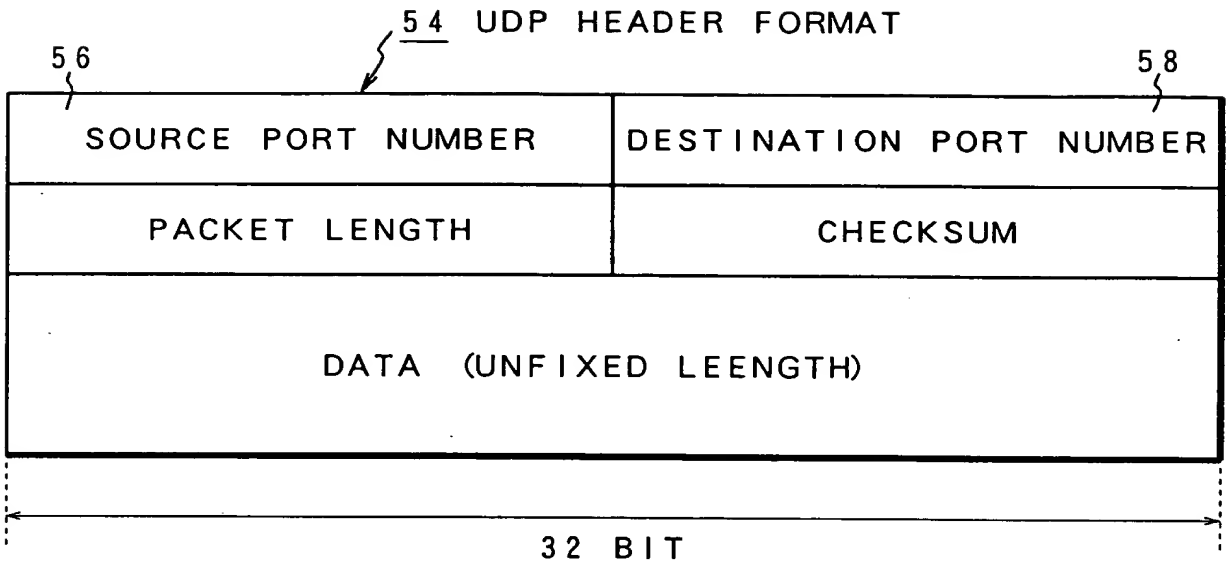


FIG. 10

36 ADDRESS TRANSLATION RULE TABLE

CLASS NAME	ADDRESS TRANSLATION	GATEWAY
BUSINESS	10. 1. 2. 0	10. 1. 2. 1
DEFAULT	10. 1. 3. 0	10. 1. 3. 1

FIG.11

38 ADDRESS TRANSLATION TABLE

PROTOCOL TYPE	PRE-TRANSLATION		POST-TRANSLATION	
	ADDRESS	PORT	ADDRESS	PORT
TCP	10.10.10.10	5000	10.1.2.10	2000
UDP	10.10.10.11	6000	10.1.3.11	2001
....	....	....	....	....

FIG. 12

ADDRESS CONFIGURATION

INTERFACE	ADDRESS	NETWORK MASK
NODE 10-1	10. 1. 1. 10	255. 255. 255. 0
ROUTER 14-1 (LAN SIDE)	10. 1. 1. 1	255. 255. 255. 0
ROUTER 14-2 (LAN SIDE)	10. 1. 1. 2	255. 255. 255. 0
ROUTER 16-1 (LAN SIDE)	10. 1. 2. 1	255. 255. 255. 0
ROUTER 16-2 (LAN SIDE)	10. 1. 3. 1	255. 255. 255. 0
APPARATUS 12 (OUTSIDE)	10. 1. 2. 2	255. 255. 255. 0
APPARATUS 12 (OUTSIDE)	10. 1. 3. 2	255. 255. 255. 0
APPARATUS 12 (INSIDE)	10. 10. 10. 1	255. 255. 255. 0
NODE 10-2	10. 10. 10. 10	255. 255. 255. 0

○ ROUTER SIDE INTERFACE OF APPARATUS 12 IS NAMED OUTSIDE AND NODE 10-2 SIDE INTERFACE THEREOF IS NAMED INSIDE.

FIG. 13A

ROUTER 14-1 ROUTING TABLE

DESTINATION SUBNETWORK	MASK	GATEWAY
10. 1. 1. 0	255. 255. 255. 0	DIRECT (DIRECT CONNECTION)
10. 1. 2. 0	255. 255. 255. 0	ROUTER 16-1

FIG. 13B

ROUTER 14-2 ROUTING TABLE

DESTINATION SUBNETWORK	MASK	GATEWAY
10. 1. 1. 0	255. 255. 255. 0	DIRECT (DIRECT CONNECTION)
10. 1. 3. 0	255. 255. 255. 0	ROUTER 16-2

FIG. 13C

ROUTER 16-1 ROUTING TABLE

DESTINATION SUBNETWORK	MASK	GATEWAY
10. 1. 2. 0	255. 255. 255. 0	DIRECT (DIRECT CONNECTION)
10. 1. 1. 0	255. 255. 255. 0	ROUTER 14-1

FIG. 13D

ROUTER 16-2 ROUTING TABLE

DESTINATION SUBNETWORK	MASK	GATEWAY
10. 1. 3. 0	255. 255. 255. 0	DIRECT (DIRECT CONNECTION)
10. 1. 1. 0	255. 255. 255. 0	ROUTER 14-2

FIG. 13E

NODE 10-1 ROUTING TABLE

DESTINATION SUBNETWORK	MASK	GATEWAY
10. 1. 1. 0	255. 255. 255. 0	DIRECT (DIRECT CONNECTION)
10. 1. 2. 0	255. 255. 255. 0	10. 1. 1. 1 (ROUTER 14-1)
10. 1. 3. 0	255. 255. 255. 0	10. 1. 1. 2 (ROUTER 14-2)

FIG. 13F

NODE 10-2 ROUTING TABLE

DESTINATION SUBNETWORK	MASK	GATEWAY
10. 10. 10. 0	255. 255. 255. 0	DIRECT (DIRECT CONNECTION)
0. 0. 0. 0 (DEFAULT)	0. 0. 0. 0	10. 10. 10. 1 (APPARATUS 12)

FIG. 14

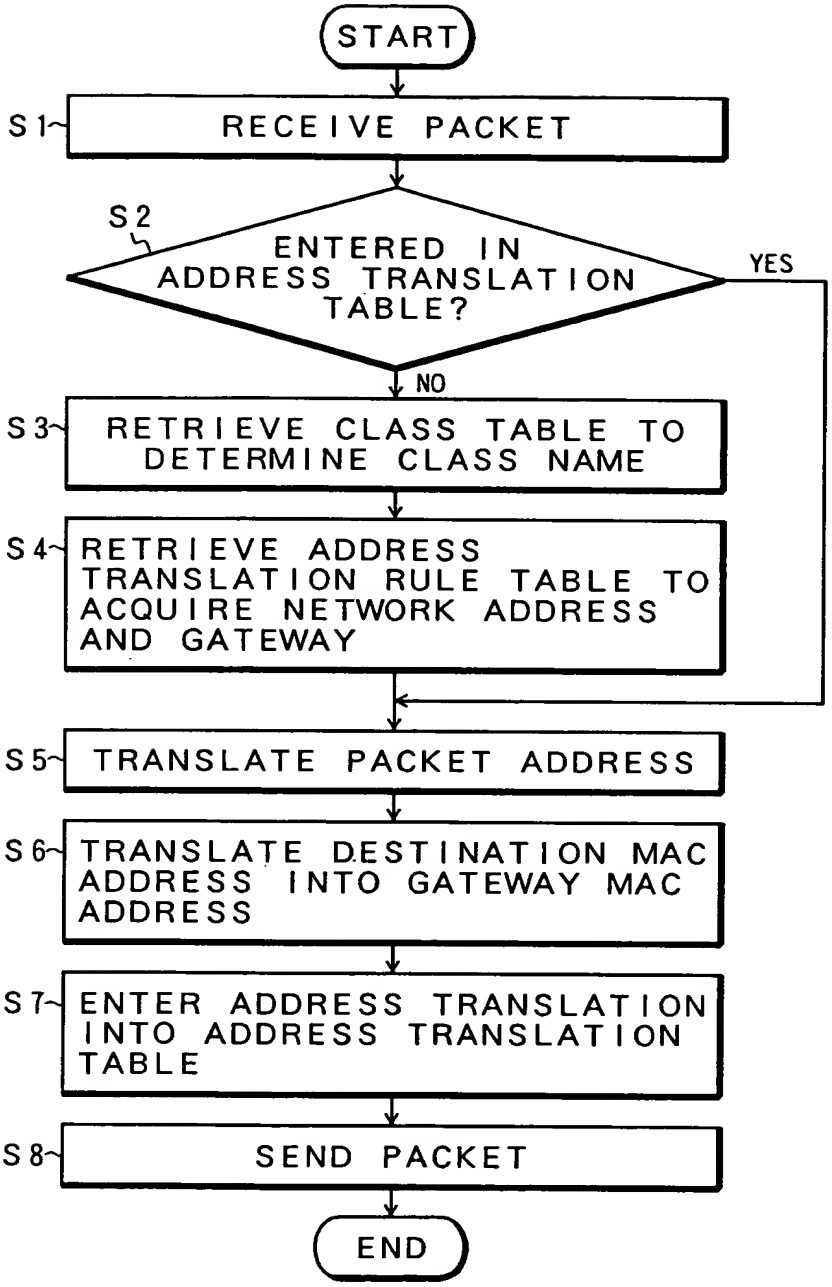

START
S1
RECEIVE PACKET
S2
ENTERED IN ADDRESS TRANSLATION TABLE?
YES
NO
S3
RETRIEVE CLASS TABLE TO DETERMINE CLASS NAME
S4
RETRIEVE ADDRESS TRANSLATION RULE TABLE TO ACQUIRE NETWORK ADDRESS AND GATEWAY
S5
TRANSLATE PACKET ADDRESS
S6
TRANSLATE DESTINATION MAC ADDRESS INTO GATEWAY MAC ADDRESS
S7
ENTER ADDRESS TRANSLATION INTO ADDRESS TRANSLATION TABLE
S8
SEND PACKET
END

FIG. 15

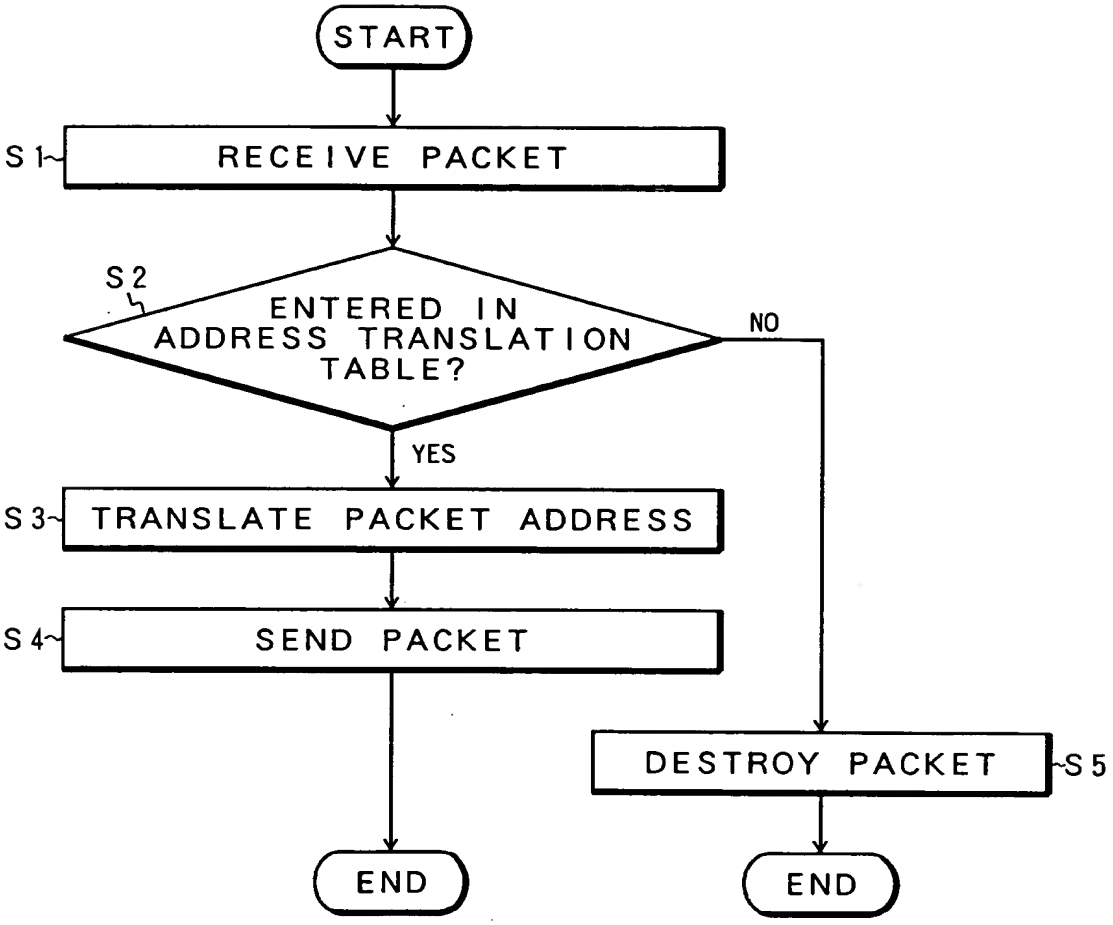

START
S1
RECEIVE PACKET
S2
ENTERED IN ADDRESS TRANSLATION TABLE?
NO
YES
S3
TRANSLATE PACKET ADDRESS
S4
SEND PACKET
DESTROY PACKET
S5
END
END

FIG. 16

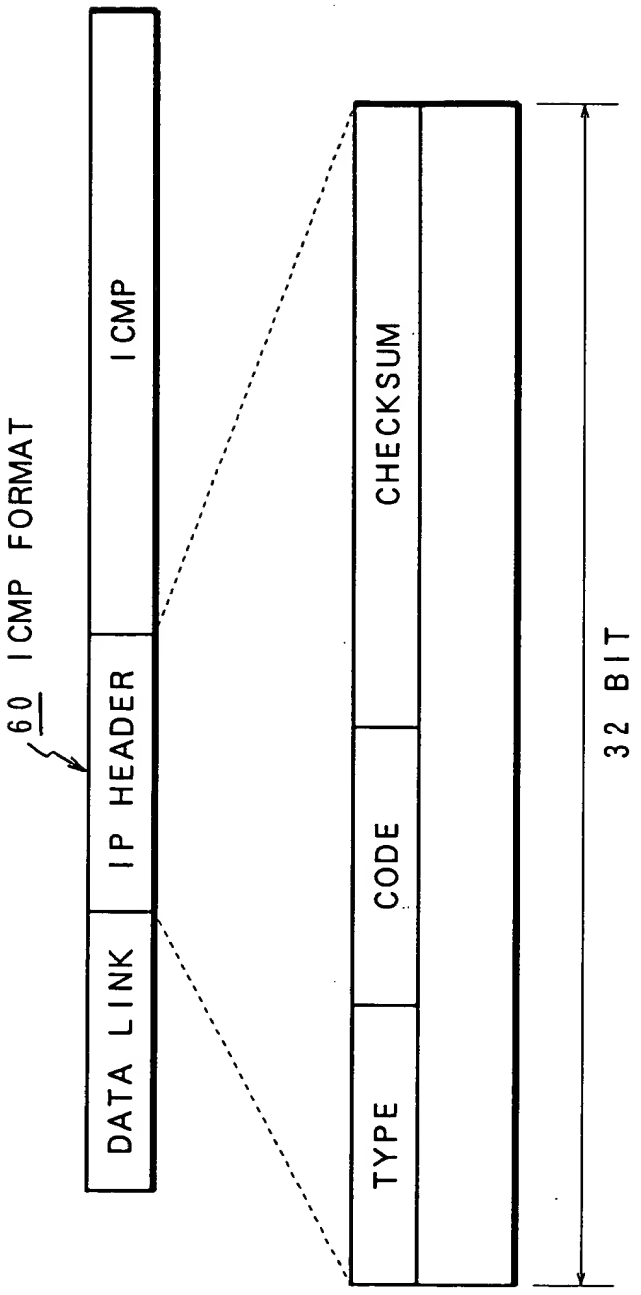

60 ICMP FORMAT
DATA LINK
IP HEADER
ICMP
TYPE
CODE
CHECKSUM
32 BIT

FIG. 17

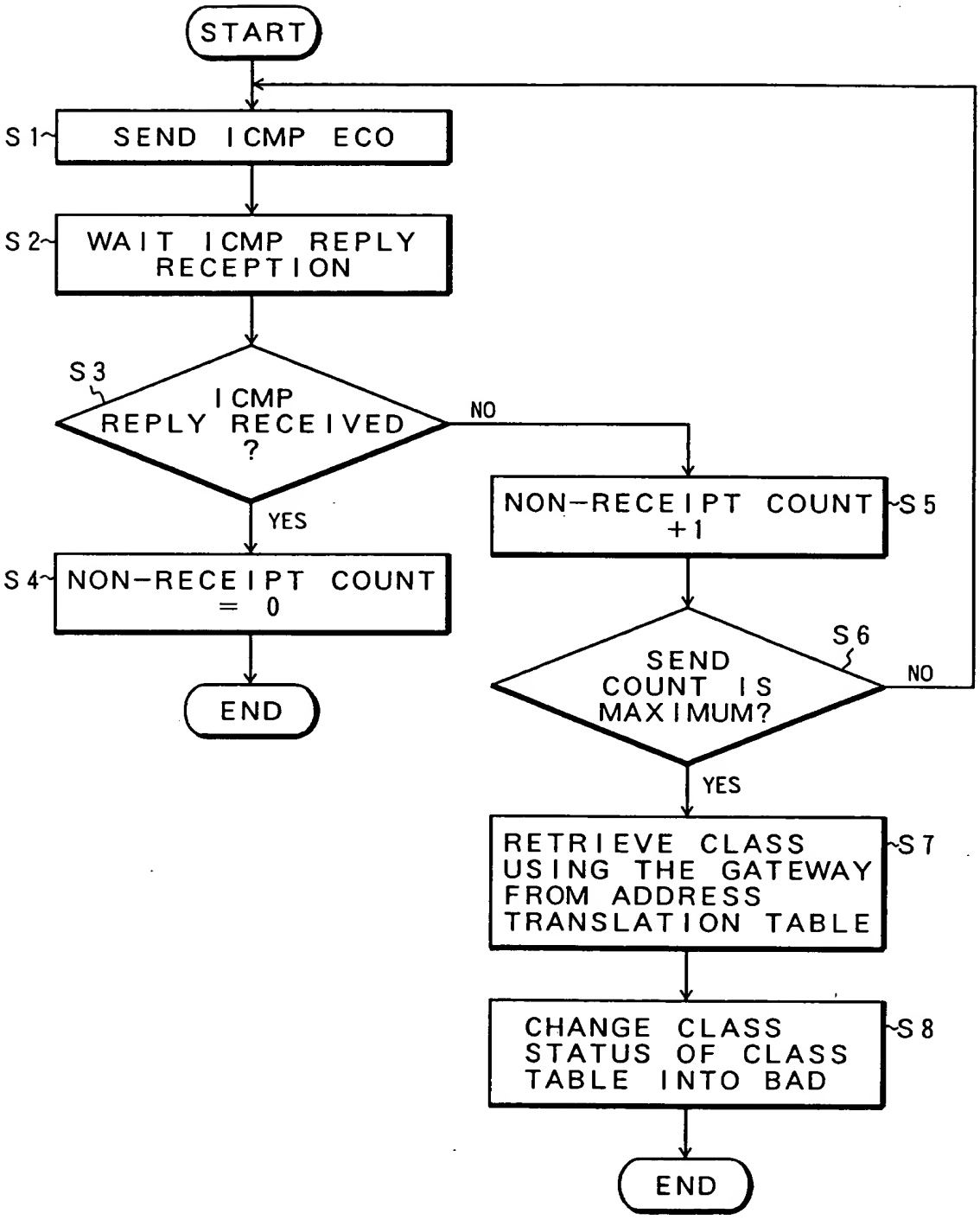
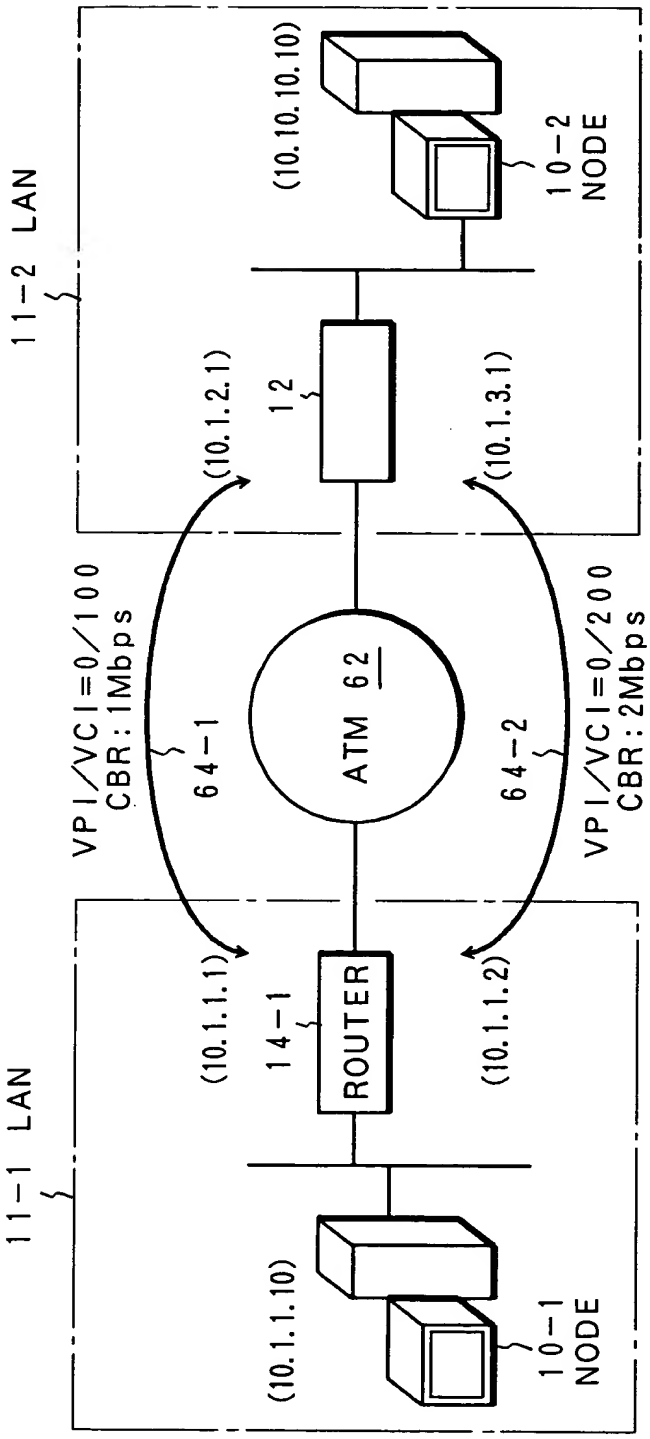

START
S1
SEND ICMP ECO
S2
WAIT ICMP REPLY RECEPTION
S3
ICMP REPLY RECEIVED ?
NO
YES
S4
NON-RECEIPT COUNT = 0
END
NON-RECEIPT COUNT +1
S5
S6
SEND COUNT IS MAXIMUM?
NO
YES
RETRIEVE CLASS USING THE GATEWAY FROM ADDRESS TRANSLATION TABLE
S7
CHANGE CLASS STATUS OF CLASS TABLE INTO BAD
S8
END

FIG. 18


11-2 LAN
(10.10.10.10)
10-2 NODE
(10.1.2.1)
12
(10.1.3.1)
VPI/VCI=0/100
CBR:1Mbps
64-1
ATM 62
64-2
VPI/VCI=0/200
CBR:2Mbps
(10.1.1.1)
14-1
ROUTER
(10.1.1.2)
11-1 LAN
(10.1.1.10)
10-1 NODE